



AFRY  
ÁF PÖYRY

# Climate change and the power sector:

Related disclosures,  
modelling and our offering



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# Background

Climate change-related risks have become a high profile issue in the financial sector

Bank of England governor: Climate risks 'not reflected in market prices of most financial assets'

UK launches scaled-back financial sector climate risk stress tests

'Absolutely critical' exercise to encompass only largest counterparties after pushback

Investors support Shell's strategy for net-zero emissions despite backlash

A growing number of shareholders call for more drastic action to combat climate change

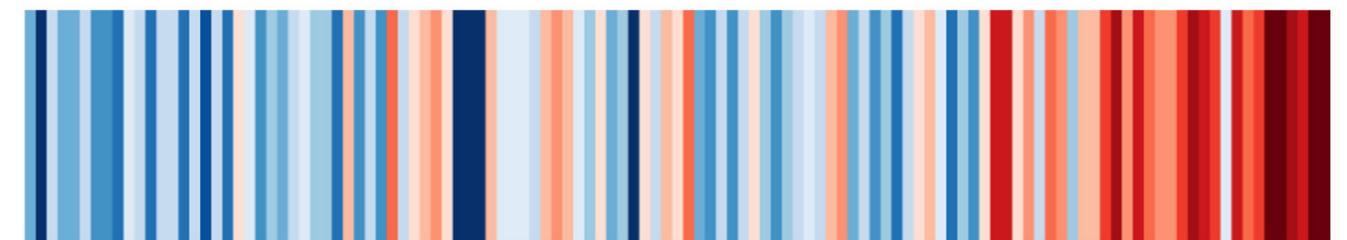
June 5, 2021  
2:56 PM BST

**United Kingdom**

**G7 backs making climate risk disclosure mandatory**

1901

2019



Annual mean temperature in Europe

# Our clients will need to understand and at least comply with a new and emergent regime to satisfy their investors and regulators

## DISCLOSURE PERSPECTIVE

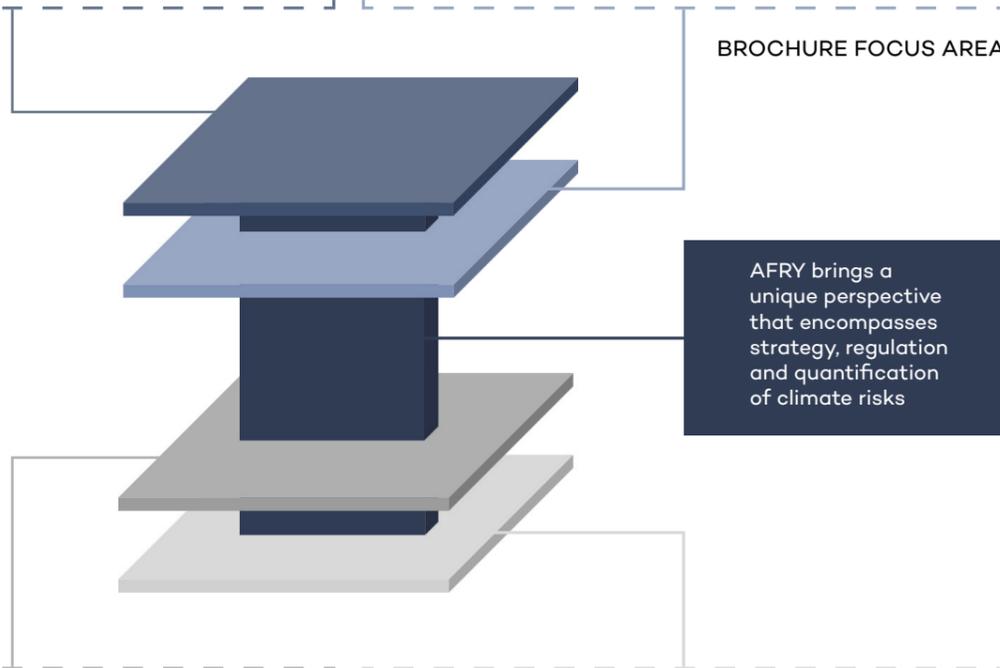
- The Financial Stability Board in 2015 established the TCFD to develop recommendations for more effective climate-related disclosures
- The Task Force developed four widely-adoptable recommendations on governance, strategy, risk management and metrics and targets

## MODELLING PERSPECTIVE

- In addition to their traditional requirements, clients will also need to consider possible impacts of alternative climate futures
- In the generation sector, this means:
  - Generation volumes and impact on market prices and revenues
  - Alternative regulatory futures to deliver climate outcomes

BROCHURE FOCUS AREA

BROCHURE FOCUS AREA



## STRATEGY PERSPECTIVE

- Clients and investors will need to consider how they assess, monitor and report on climate risks, and how they adapt their portfolios in response
- Decarbonisation represents an existential threat to some companies, but also a huge growth opportunity for those that are best positioned

## RISK MANAGEMENT PERSPECTIVE

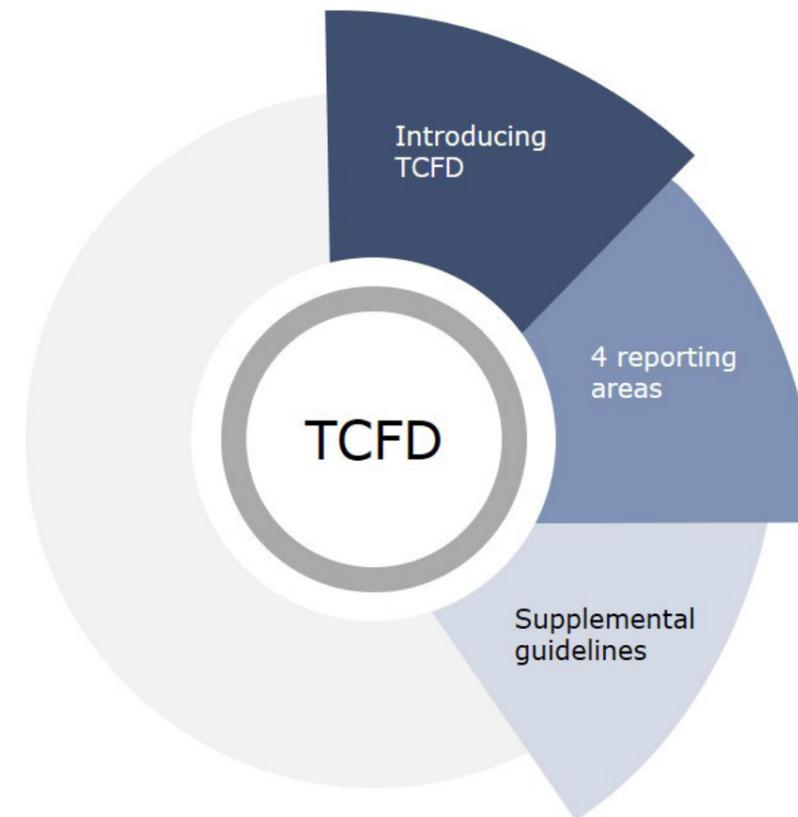
- Clients will need to identify, assess and manage climate related risks
- Clients will need to integrate climate risks assessment in their Enterprise Risk Management framework



# Task force on climate related financial disclosures (TCFD)



## What is the Task Force on Climate-related Financial Disclosure (TCFD)?



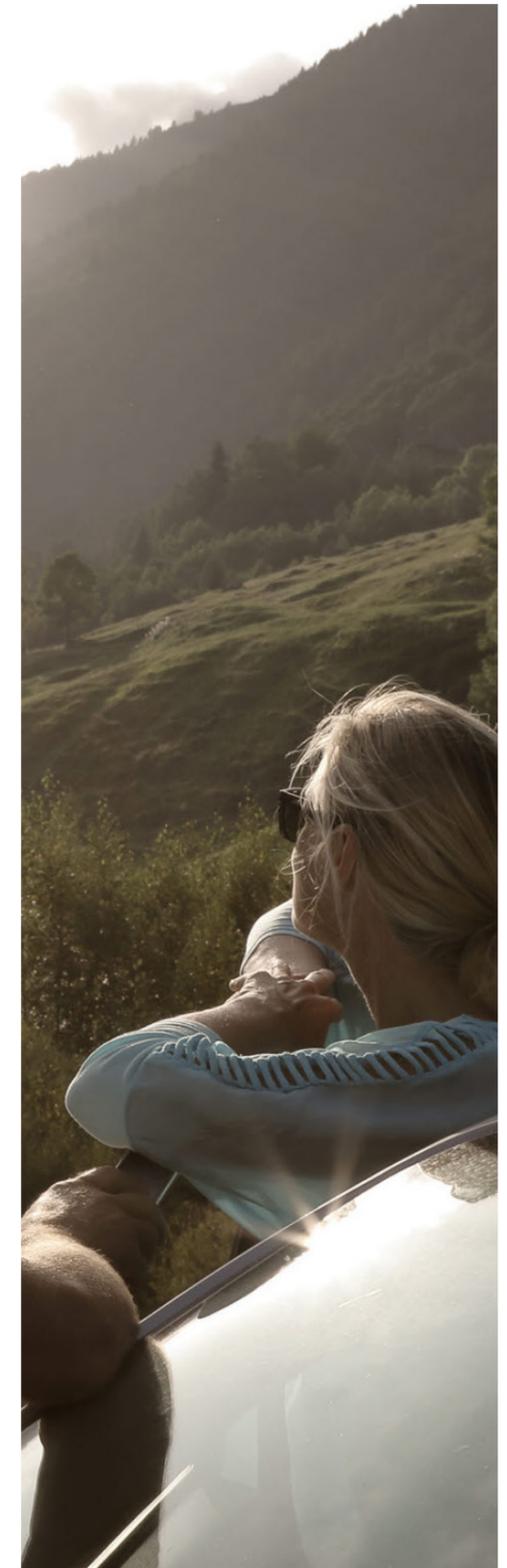
The Task Force on Climate-related Financial Disclosures (TCFD) – was established in 2015 by the Financial Stability Board (FSB)<sup>1</sup> – has the goal of developing recommendations on reporting of climate-related risks and opportunities, thereby meeting the expectations and needs of investors

The TCFD released recommendations on reporting of risks and opportunities that climate can pose on corporate performance for four areas:

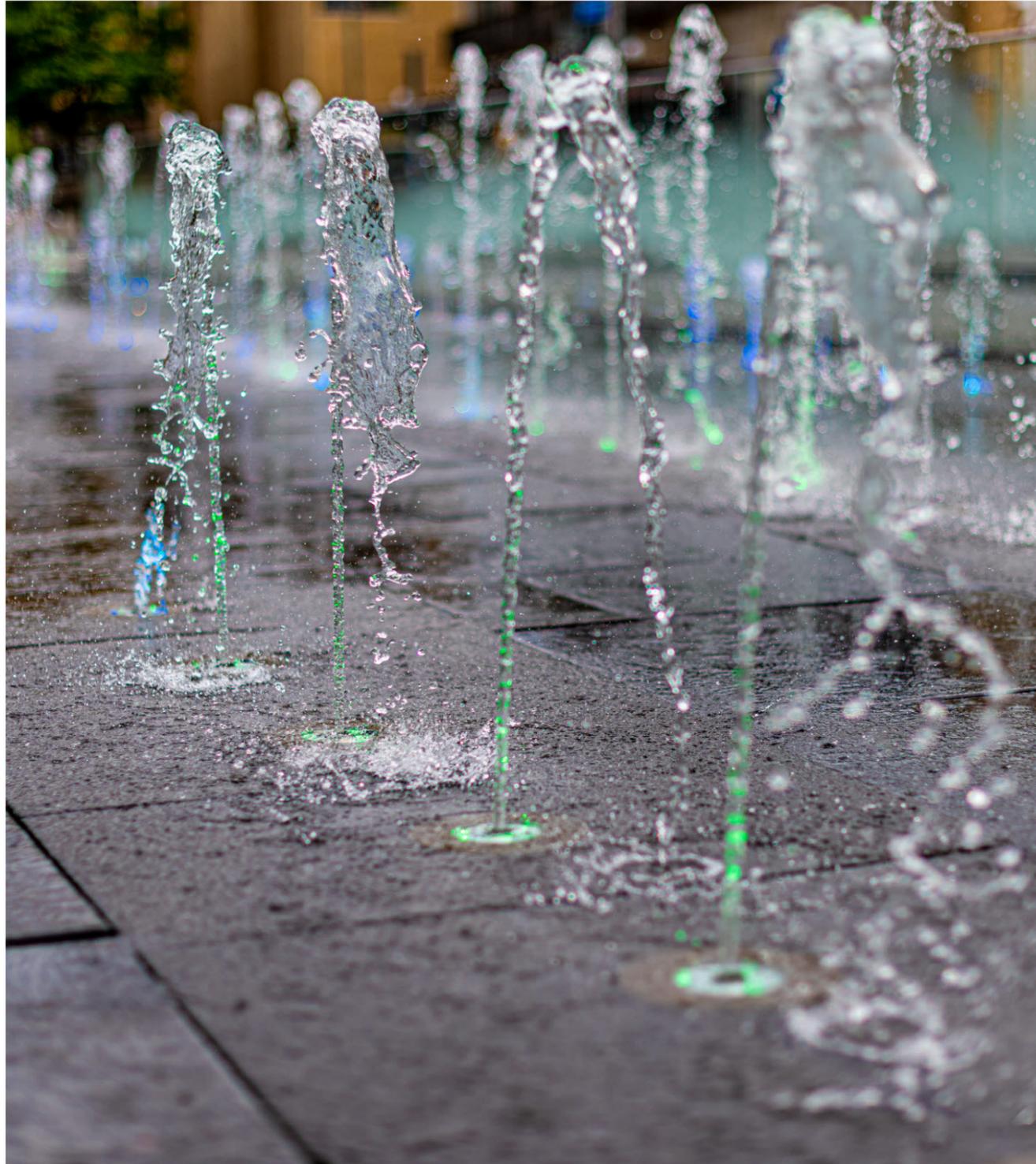
- Organization's governance
- Strategy
- Risk management
- Metrics and targets

The TCFD has further created supplemental guidance for the following organizations:

- Financial companies (banks, insurance companies, asset owners, asset managers)
- Non-financial companies (energy, transportation, material & building, agriculture, food and forest products operators)



# The TCFD recommendations are structured around the four thematic areas: Governance, Risk Management, Strategy and Metrics & Targets



## GOVERNANCE

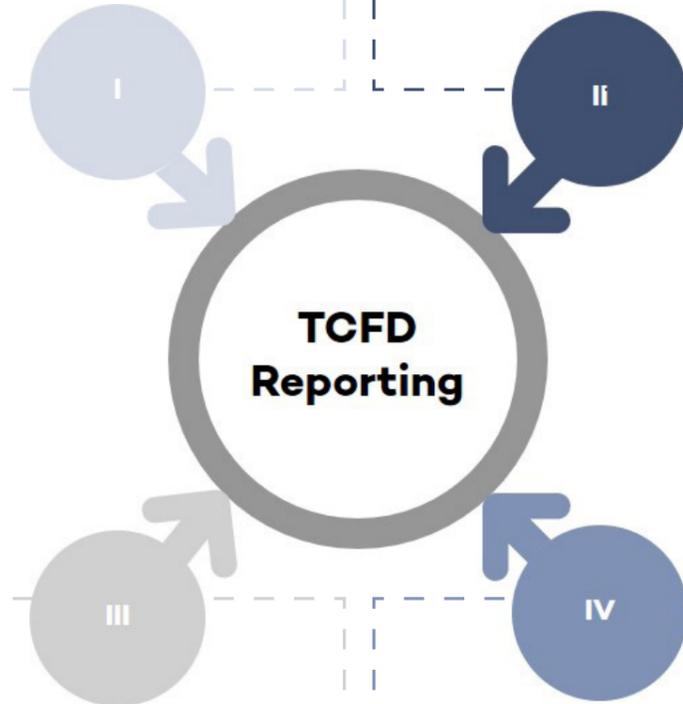
Disclose the organisation's governance around climate-related risks and opportunities

- Describe the organisation's governance around climate-related risks and opportunities
- Describe management's role in assessing and managing climate-related risks and opportunities

## RISK MANAGEMENT

Disclose how the organisation identifies, assesses, and manages climate-related risks

- Describe the organisation's processes for identifying and assessing climate-related risks
- Describe the organisation's processes for managing climate-related risks
- Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organisation's overall risk management



## STRATEGY

Disclose the actual and potential impacts of climate-related risks and opportunities on the organisation's businesses, strategy, and financial planning where such information is material

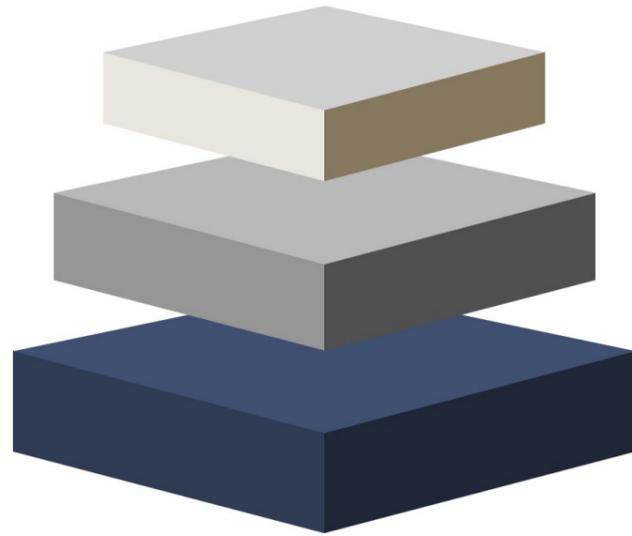
- Describe climate-related risks and opportunities the organisation has identified over the short, medium, and long term
- Describe the impact of climate-related risks and opportunities on the organisation's businesses, strategy, and financial planning
- Describe the resilience of the organisation's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario

## METRICS & TARGETS

Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material

- Disclose the metrics used by the organisation to assess climate-related risks and opportunities in line with its strategy and risk management process
- Disclose Scope 1, Scope 2 and, if appropriate, Scope 3 greenhouse gas (GHG) emissions and the related risks
- Describe the targets used by the organisation to manage climate-related risks and opportunities and performance against targets

# How might these selected physical and transitional risks impact your energy business?



<sup>1</sup>Technology Risk is one out of four transition risk categories addressed by TCFD: Policy and Legal | Technology | Market | Reputation | AFRY can cover all four categories with its diverse teams, capabilities and knowledge realms



## TRANSITIONAL TECHNOLOGY RISKS <sup>1</sup>

- Decreasing competitiveness of certain organisations due to the development and use of emerging technologies
- Example: Loss of competitiveness on the market due to the development of low-carbon technologies



## CHRONIC PHYSICAL RISKS

- Limited availability of water for consumption as well as for freshwater abstractions to cool power plants
- Example: Higher operating costs related to plant operation due to higher cooling water temperatures



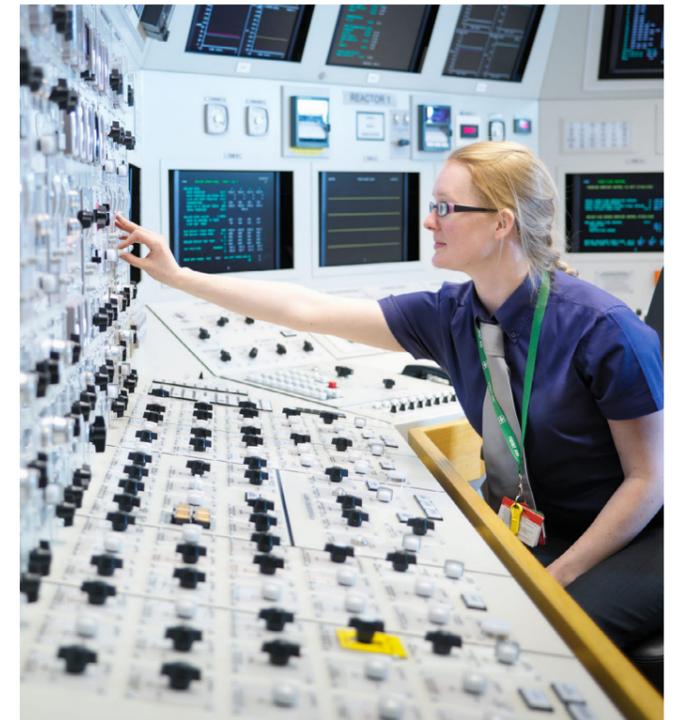
## ACUTE PHYSICAL RISKS

- Assets exposed to stormwater impact or river and coastal flooding
- Example: Lost revenue due to breakdown / damage / unavailability of production facilities due to sudden extreme weather events



# AFRY power sector impact modelling

Physical climate risks are affecting the power sector in a variety of areas



## TEMPERATURE RISE

- Heating demand is falling with increasing temperature
- Cooling demand is rising with increasing temperature

## HYDROLOGY

- Temperature is affecting evaporation and snow cover
- Precipitation is affecting hydro inflow

## SOLAR

- Generation is affected by irradiation & cloud coverage
- Temperature impacts PV-module efficiency

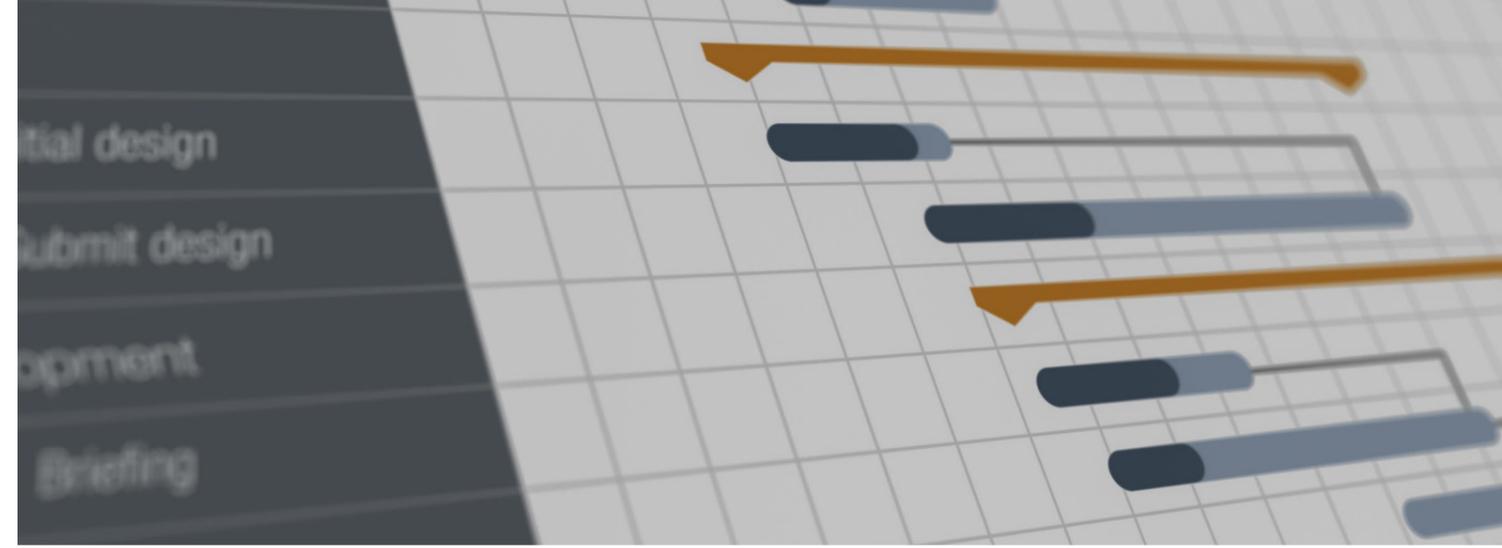
## WIND

- Air pressure is affecting wind power
- Atmospheric dynamics are affecting generation patterns

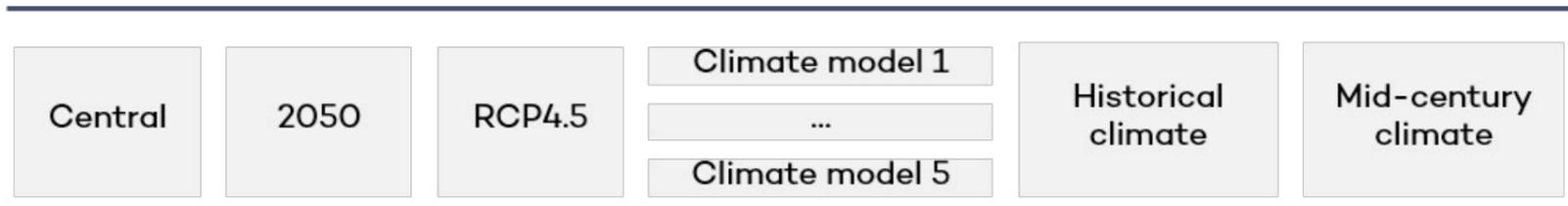
## THERMAL AVAILABILITY

- River flow is affecting plant cooling water
- Temperature is affecting thermal efficiency

Long-term investments must consider these effects of climate change:  
Our power market analyses allow to do so



 **BID3 MARKET MODELLING**

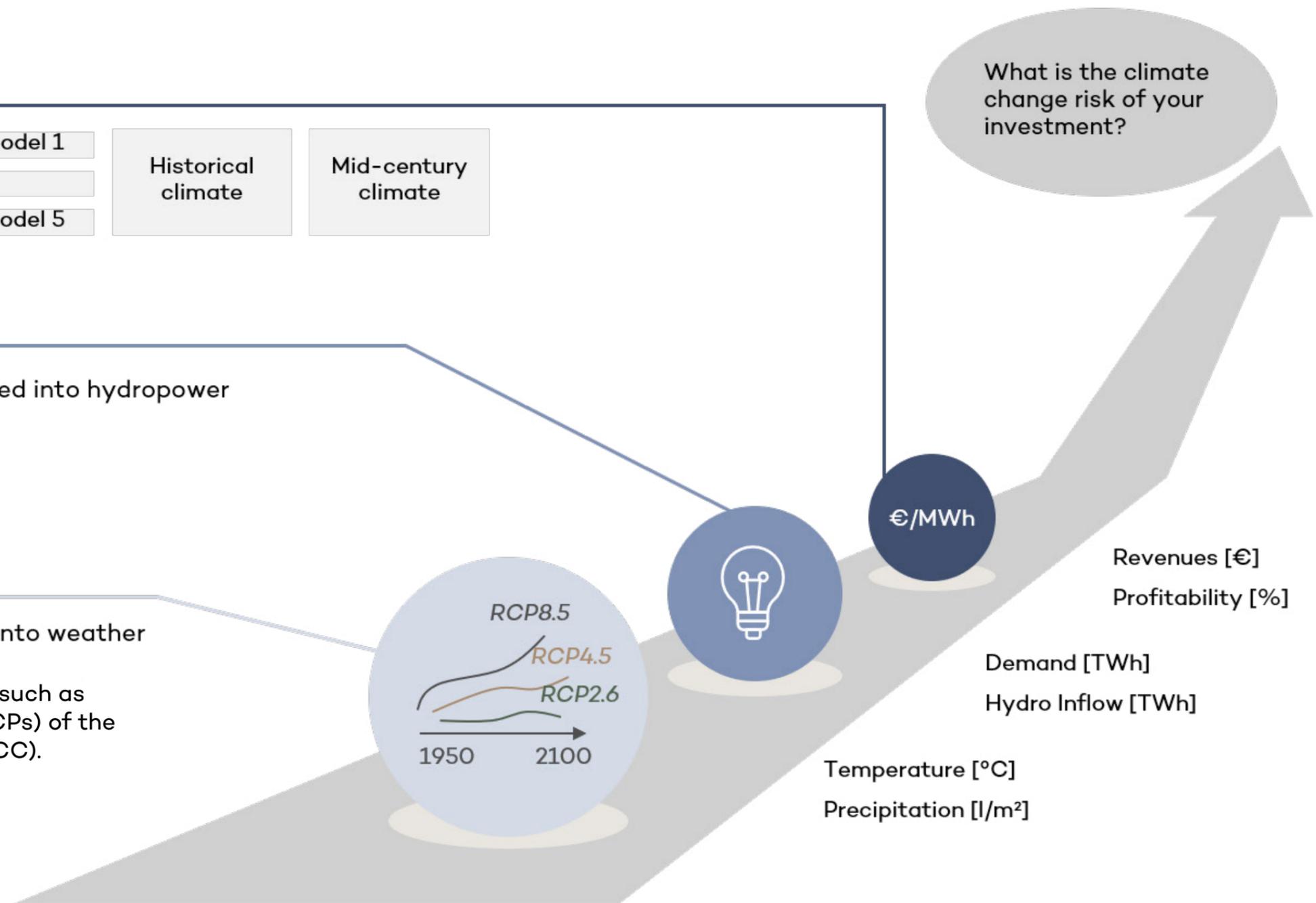


**WEATHER IMPACT ON POWER SECTOR**

- High-resolution weather patterns are translated into hydropower plant inflow and demand profiles

**EMISSION PATHWAYS AND CLIMATE CHANGE**

- Regional climate models translate emissions into weather patterns
- Different emission scenarios can be considered, such as the Representative Concentration Pathways (RCPs) of the Intergovernmental Panel on Climate Change (IPCC).





Modelling results teaser: With our modelling results we provide our customers valuable insights into your future revenue dynamics

CHANGE IN REVENUES IN 2050 FOR...



BASELOAD GENERATORS



HYDRO GENERATORS



WIND GENERATORS\*

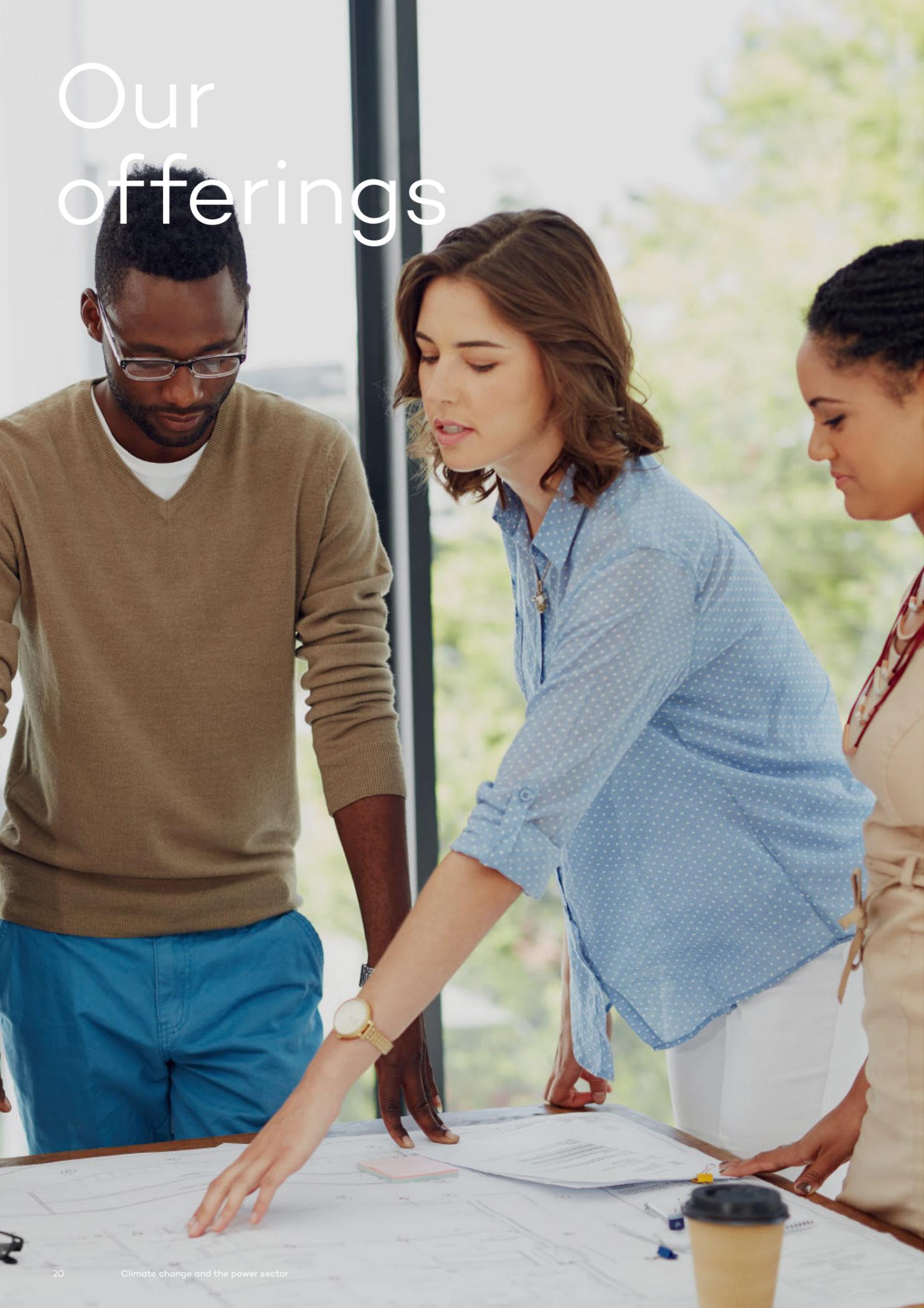


SOLAR GENERATORS



— Baseload revenues expected to increase in southern Europe but weaken elsewhere. Wind and solar follow this pattern, while hydro is the reverse

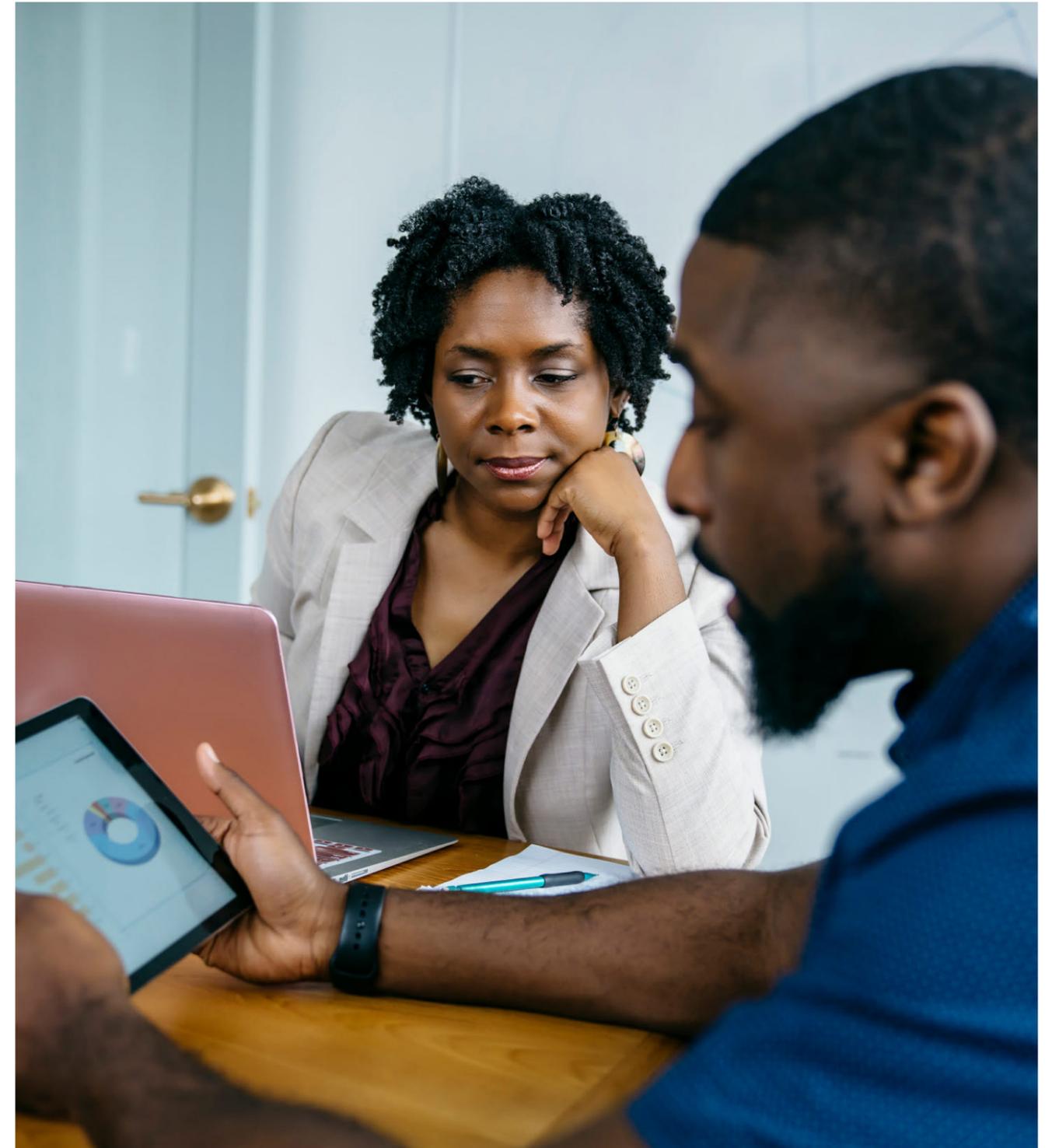
# Our offerings

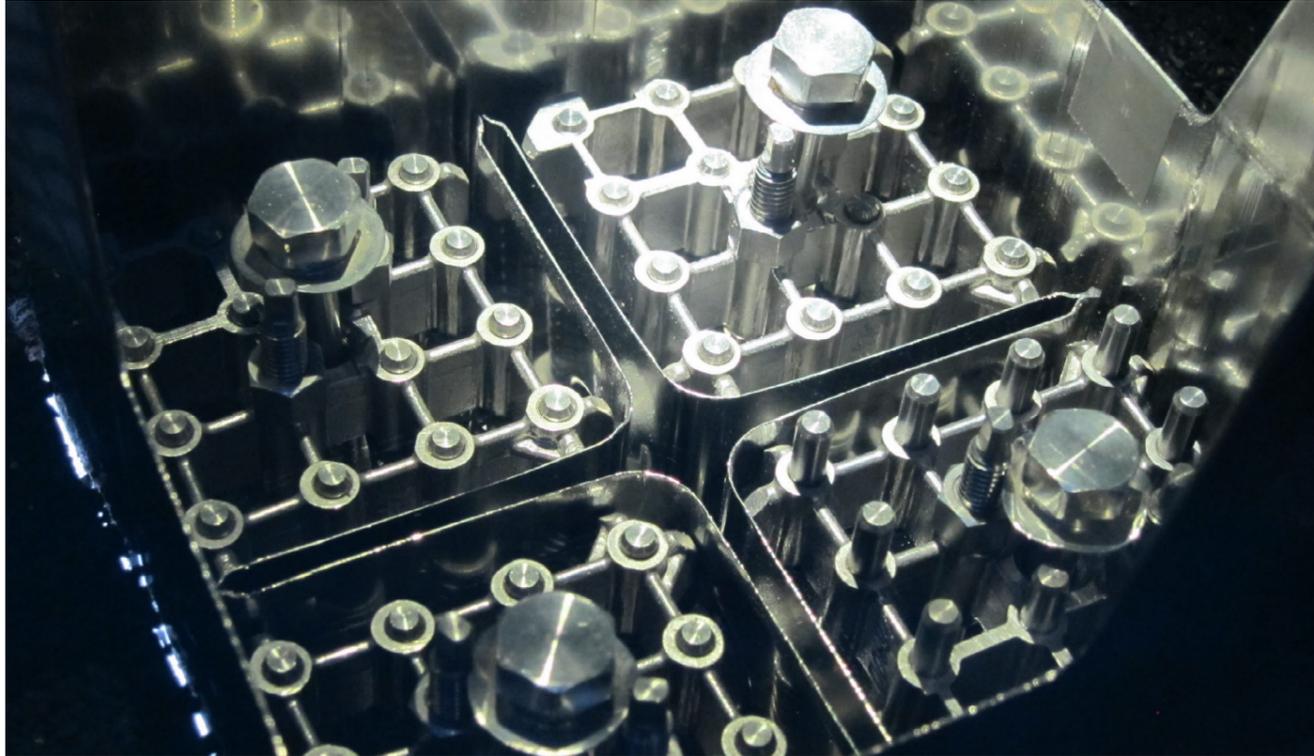


## OUR OFFERING

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We offer a wide range of services to support our clients in managing the impacts of climate change





**DISCLOSURE AND COMMUNICATION**

Identification of the climate change related information to be presented in the non-financial report

**REVIEW OF CLIMATE GOVERNANCE**

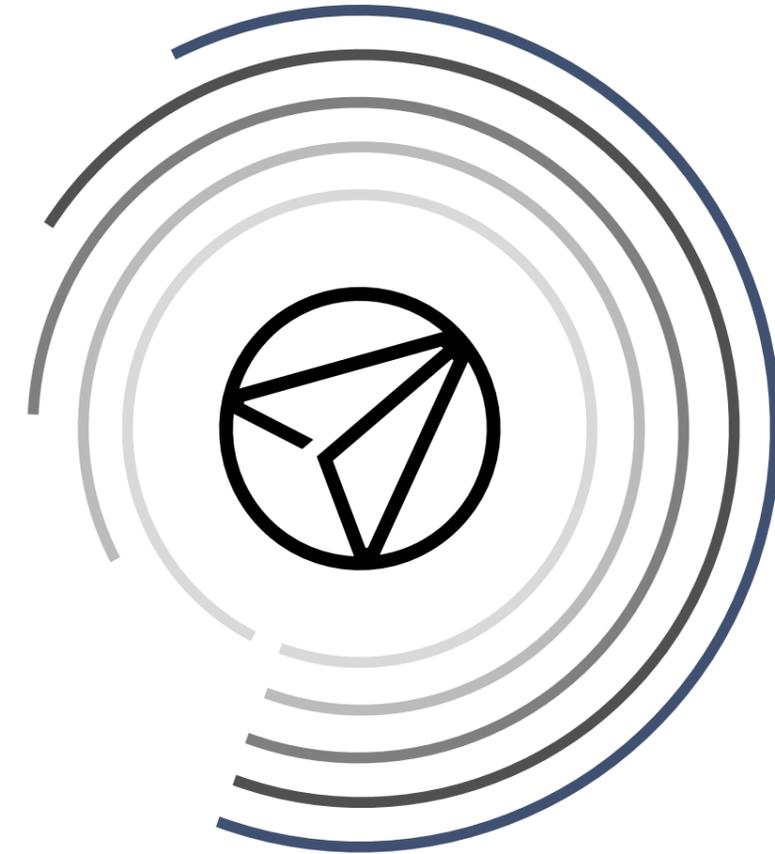
Analysis of the roles and responsibilities of the board and of the C-suite with respect to climate (Climate Governance) and proposal for their extension; analysis of climate policies with a focus on items related to the mitigation of and adaptation to climate change, and proposal for their extension, if needed

**STRATEGY DEVELOPMENT**

Climate positioning & portfolio re-design; transaction support with disposals and acquisitions

**ASSESSMENT BUSINESS MODEL**

Analysis of the business model in terms of strategy, financial planning and value chain in order to identify the related climate impacts within recognised climate scenarios



**MODELLING SUPPORT**

We offer a climate change power market sensitivity for the year 2050 in AFRY's Central scenario. This scenario is based on the emission pathway RCP4.5 corresponding to a 1.5 - 2.0°C warming. As such it delivers insights on the following points for the power market:

What are regional temperature effects? How do patterns change per NUTS3 region?

What are the effects on hydrology? How do generation patterns and volumes change?

What are the effects on demand? How do patterns and volumes change as a result of changing heating/cooling?

What are the effects on yearly/monthly prices?

What are the effects on revenues from hydro/solar/wind generation?

We accelerate the transition towards a sustainable society



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Together with our specialists from AFRY's engineering divisions we offer a wide range of services in climate change mitigation and climate change adaptation.

AFRY is a European leader in engineering, design, and advisory services, with a global reach. We accelerate the transition towards a sustainable society.

We are 17,000 devoted experts in infrastructure, industry, energy and digitalisation, creating sustainable solutions for generations to come.

Making Future